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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

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SOME ALGAE FROM THE CHINCHA ISLANDS.

Frank S. Collins.

Dr. M. A. Howe has recently published an interesting and thorough paper on the marine algae of Peru [1] based chiefly on collections made from 1906 to 1908 by Dr. Robert E. Coker, while acting as fisheries expert for the Peruvian government. In addition to this collection Dr. Howe has included in his paper all the earlier records for the Peruvian coast, revising these records by inspection and comparison of original specimens. The result is a paper of 185 pages with 66 plates; this coast, in regard to which algological data were few and far between, thus becomes one of the best known regions, outside of the "home regions" of the North Atlantic and the Mediterranean.

In looking over Dr. Howe's book, there was recalled to my mind a small collection of algae from the Chincha Islands, off the Peruvian coast, which I looked over in 1895, but had hardly thought of since. In that year the late Prof. Francis L. Harvey sent me from the Maine State College (now the University of Maine) at Orono, a lot of algae for determination; most of them were from the coast of Maine, and were familiar species, but there was among them this lot of about 15 sheets, referred to as "Chincha Islands specimens" but with no record as to collector or date. More than half were well known species, a few I could name only with a doubt, and as to two I could give no name whatever; this I find on going back to the memoranda made at the time. So much having been recalled to my mind, I wrote to Prof. M. A. Chrysler, now in charge of botany at the University of Maine, and he was kind enough to send me the specimens, which fortunately had been kept by themselves, not distributed in the general herbarium; the two specimens to which I could give no name could not be found, however. On examining the others and comparing them with Dr. Howe's paper, I felt that the safest way would be to submit them to Dr. Howe, which I did, and he very kindly examined them. Before giving the list with the results of his examination, I will state what I have been able to learn of the circumstances under which these plants were collected; I think they will be of interest, especially as they give an incidental view of some former conditions in New England, now quite passed away.

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[1] Marshall Avery Howe, The marine algae of Peru; Mem. Torrey Bot. Club, Vol. XV, p. 1, 1914.

The M. S. C. label on the cover containing the specimens has the record "These algae were collected at the Chincha Is. in 1865 by Mrs. J. H. Nickerson Bangor and donated by her to the college." I think this is in Prof. Harvey's writing. No one now at the College remembers anything about the matter. Some friends of mine in Bangor were obliging enough to make inquiries, and at their suggestion I wrote to Capt. J. H. Nickerson at South Orrington, Maine; I received an interesting reply from J. E. Nickerson of that place, who was not the man in question; he did however once know a Captain John Nickerson of West Bucksport, a "Deep water man" of 40 or 50 years ago. Both the captain and his wife were dead long since, but Mr. Nickerson suggested my writing to Capt. William S. Higgins of Morse & Co., Bangor; Capt. Nickerson's wife was a sister of D. J. Morse of that house, and Capt. Higgins's wife her niece. I found Capt. Higgins extremely kind in trying to get the information I wanted, but at first it seemed hopeless. D. J. Morse was dead, as well as his sister and his brother-in-law; no one could be found who remembered anything about the collections. Finally however, Capt. Higgins was successful to a certain extent, and I learned that Capt. J. K. (not J. H.) Nickerson was at the Chincha Islands in 1862, in command of the bark "Evening Star"; he sailed from the islands to Antwerp and there sold the vessel, returning to New York with Mrs. Nickerson by steamer. After returning he had a ship built for him at Brewer, the "Jennie Hight"; this ship was lost on the Florida coast, on her first voyage.

In those days and for many years before, New England captains and their ships were to be found in all quarters of the world; and often their wives went with them, and this is not the only case where the woman, when the ship was lying in some foreign port, would mount a little lot of pretty "sea mosses" just as she had done at Pemaquid or Cape Elizabeth, or some other favorite locality at home. We cannot claim it as an exclusively American habit; some readers of RHODORA may recall a note of mine[1] giving account of algae collected by a Norwegian sailor, Axel Moe, including some collected by his sister, Ragnhild Moe, accompanying him on one of his voyages. It is a pleasant idea, not going from home to these places, but taking home with one to them. But it was not all pleasure; incidental remarks in the letters I have received from kind friends who have helped me in looking up this matter show another side. "His second wife was badly injured when he lost the ship D. J. Morse." "My daughter was born, on board ship, at Independencia Bay, about thirty miles south of the Chinchas, 1875." The conditions under which these things happened are now all gone by; Capt. Higgins writes me "I commanded ships twenty years, and have been to the Chincha Islands twice. Since leaving the sea I have been located here in the lumber business, and my past sea life and the old Chinchas seems like a dream."

It is probable that the few specimens now in question are not all that Mrs. Nickerson collected; I have gone into some detail as to my investigations in the hope that some one reading this note may recall some similar collection. The specimens are mounted on good heavy paper, almost cardboard; they are neatly mounted, and are in so good condition that minute epiphytes on them can be examined and determined. The following is the list: —

ULVA sp. Too fragmentary for specific determination.

ENTEROMORPHA PROLIFERA (O. F. Müll.) J. Ag.

ENTEROMORPHA INTESTINALIS (L.) Grev.

ENDODERMA STRANGULANS M. A. Howe, in *Cladophora fascicularis.*

CLADOPHORA HARIOTINA M. A. Howe. Fragmentary.

CLADOPHORA FASCICULARIS (Mont.) Kütz. A rather open form, with long, virgate, but rather flexuous branches.

*CHAETOMORPHA LINUM (O. F. Müll.) Kütz. Fragmentary, but fairly characteristic.

*ECTOCARPUS MITCHELLAE Harv. With plurilocular sporangia (meiosporangia) somewhat smaller than usual. A plant of wide range, common on the shores of the Atlantic from Great Britain to the Canaries and from Massachusetts to Florida, and on the coast of California; but this appears to be the first record for South America; this distribution assumes the identity of *E. Mitchellae* Harv. and *E. virescens* Thuret which seems to be now fairly well assured. The history of this species is of some interest; published by Harvey in 1852,[1] on a plant collected at Nantucket by Miss Mitchell, nothing more was known of it for a long time. Farlow [2] says "Only known from the description and plate in the Nereis." The next mention is ten years later [3] when specimens collected by Miss Laura Jernegan at Edgartown were referred to this species, and attention was called to its resemblance to *E. virescens* Thuret. The latter name was used, but as *nomen nudum* only, by Flahault [4] and by Holmes and Batters,[5] but the actual publication was in a paper by Sauvageau.[6] In this paper Sauvageau describes the two forms of plurilocular sporangia found in this species, indicating relationships not before known in the brown algae. In a later paper [7] Sauvageau considers the Edgartown plant to be probably the same species but thinks proof is needed of its identity with *E. Mitchellae* Harv. Börgesen [8] has compared authentic material of both species, finding only such minor differences as are to be expected in a plant as widely distributed as this. *E. Mitchellae,* with meiosporangia, was distributed from Edgartown as No. 321 in Collins, Holden & Setchell, Phycotheca Boreali-Americana, and from Bermuda as No. 1921; with megasporangia from La Jolla, California, as No. 671; megasporangia have also been found at Bermuda.

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[1] A sailor's collection of algae, RHODORA, Vol. VI, p. 181, 1904.

Chondrus canaliculatus (Ag.) Grev. With cystocarps; quite like the large, little dissected plants collected by Dr. Coker at the same locality.

Gigartina Chamissoi (Ag.) J. Ag.

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[1] W. H. Harvey, Nereis Boreali-Americana, part 1, p. 142, Pl. XII. G, 1852.

[2] W. G. Farlow, Marine algae of New England, p. 72, 1881.

[3] F. S. Collins, Notes on New England marine algae, V. Bull. Torrey Bot. Club, Vol. XVIII, p. 335, 1891.

[4] C. Flahault, Herborisations algologiques au Croisic, Bull. Soc. Bot. de France, Vol. XXXV, p. 381, 1888.

[5] E. M. Holmes & E. A. L. Batters, A revised list of the British marine algae. Annals of Botany, Vol. V, p. 79, 1892.

[6] C. Sauvageau, Sur l'Ectocarpus virescens Thuret. Jour. de Bot., Vol. X, p. 98 (p. 37 of reprint) 1896.

[7] C. Sauvageau, Note préliminaire sur les algues marines du golfe de Gascogne, Jour. de Bot., Vol. XI, p. 177 (p. 12 of reprint) 1907.

[8] Börgesen, The marine algae of the Danish West Indies, part 2, Phaeophyceae, p. 129, 1914.

GIGARTINA LESSONII (Bory) J. Ag. These two species are represented each by a well developed typical plant, with cystocarps.

* GRACILARIA CONFERVOIDES (L.) Grev. A long, slender, little branched form; tetrasporic and cystocarpic specimens on the same paper. There appears to be no record in print of the occurrence of this species on the coast of South America, but Dr. Howe reports having received two sterile specimens from Valparaiso, Chile, which he places under this species.

RHODYMENIA CORALLINA (Bory) Grev. In this specimen the frond is flat, even to the point of attachment, very regularly dichotomous and flabellate; there is no trace of the terete stipe occasionally found in this species, always in *R. flabellifolia* (Bory) Mont. The cystocarps, however, are distinctly apiculate, similar to the cystocarps in the plants assigned to *R. flabellifolia* by Howe, while in the plants assigned by him to *R. corallina* the cystocarps were not at all apiculate. It would seem then that cystocarpic characters cannot be depended on for the distinction of the two species.

* PLOCAMIUM COCCINEUM (Huds.) Lyng. forma **compactum** f. nov. ramificatione ad omnes partes densa; axibus principalibus mox indistinctis; pinnulis brevibus, basi contiguis; ramuli fertilis pedicello brevi sporophylla brevia, numerosa, dense fasciculata, ferente.

Branching dense throughout; main axes soon indistinct; pinnules short, contiguous at base; fertile branchlets with short pedicel and densely packed, short sporophylls. Chincha Islands, Peru, Mrs. J. K. Nickerson. Type in herb. University of Maine, Orono, Maine.

If compared with the slender form of *P. coccineum* common in Europe, the present plant would seem amply distinct, specifically, but there is a great variety in habit even in European plants, as will be seen by comparing the figures by Turner,[1] Greville,[2] and Harvey.[3] The first two represent the slender form, the last the broader form; the Californian plant resembles the latter, and like some other species common to Europe and California, is a larger and somewhat ranker plant than the European. Forma *compactum* agrees with the Californian plant in the breadth of the branches of the various orders, but the branches divide more frequently, the branch being often of the same size as the axis, and giving a subdichotomous appearance. In

[1] Dawson Turner, Fuci, Vol. I, p. 130, Pl. LIX, 1808.

[2] R. K. Greville, Algae Britannicae, p. 98, Pl. XII, 1830.

[3] W. H. Harvey, Phycologia Britannica, Pl. CLXXV, 1846–51.

the Californian plant there are usually a few long virgate axes; in forma *compactum* the main axes are soon lost among the frequent forkings. The tetraspores are as usual borne in transformed ramuli, but instead of a few, often only two or three, lanceolate sporophylls, we have a dense cluster, the sporophylls often overlapping, occasionally so numerous that the original formation in one plane is hardly distinguishable. The color is a dark, dull purplish red.

P. coccineum has a wide but peculiar distribution. In Europe it ranges from the Faroe Islands to the Canaries and throughout the Mediterranean; in America it is known to occur from Vancouver to the Mexican boundary, at the Galapagos Islands, and on the coast of Chile. I can find no certain record of its occurrence on the American shore of the Atlantic. Harvey,[1] after the record of the California locality, adds "Boston Bay, Miss Hawkshurst." Bailey [2] gives "Mass., Rev. J. L. Russell." Hooper,[3] has "Lynn, Massachusetts." I have a specimen marked "Plocamium coccineum Salem and Cohasset, Mass., J. L. Russell." The specimen is a small scrap of *Ceramium rubrum* (Huds.) Ag.; it is a peculiar form, with many short, often curved ramuli, set in secund series of three or four, really resembling some of the more slender forms of *P. coccineum.* A glance with a pocket lens, however, shows at once the articulate structure. Harvey continually refers in the Nereis to the Hooper and Bailey collections, and when, as in the case of the species now in question, and also the "*Delesseria Hypoglossum,* Boston," "*Rhodymenia Palmetta,* Newburyport" and others of Hooper's list, Harvey makes no mention, we may safely conclude that he considered the determination wrong, or the record otherwise unreliable. Before the publication of the Nereis there was no text book for this country, and American collectors perforce made use of English manuals. As noted by Farlow [4] it is not uncommon to find *Euthora cristata* labelled *Plocamium* in the older collections; moreover I have seen in such collections specimens of European species marked with American localities, when character of paper and handwriting of name agreed with other European specimens in the same collection, the record of locality being in a different writing from that of the name. There is no occasion to suppose that there was any intentional deception, but allowance must always be made for the possibility of mistakes of this kind in older collections of amateurs, who have received specimens from foreign correspondents. I think we can safely ignore the "Boston Bay" reference, and consider that the species is not known on the western side of the Atlantic.

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[1] W. H. Harvey, Ner. Bor.-Am., part 2, p. 153, 1853.

[2] J. T. Bailey, Notes on the algae of the United States, Am. Jour. Sci., Ser. 2, Vol. III, p. 84, 1847.

[3] John Hooper, Introduction to Algology, p. 24, Brooklyn, 1850.

[4] Marine Algae of N. E., p. 151, 1881.

As regards the west coast of the Pacific, De Toni[1] records *P. coccineum* "Hab. ad Enoshima (K. Okamura n. 18)," but later[2] under *P. coccineum* makes no mention of Japanese localities and no reference to the earlier paper under this species. Okamura[3] figures *P. leptophyllum* Kütz. var. *flexuosum* J. Ag. with reference to De Toni, Syll. Alg., Vol. IV, p. 589, and synonym *P. coccineum* var. *flexuosum* Harvey. It seems safe to conclude that *P. coccineum* is limited to the east shore of each ocean. As to the suggestion of De Toni, l. c., p. 591, that the Californian plant should be placed under *P. leptophyllum* Kütz., it is negatived by the fact that the plants distributed as P. B.-A., No. 994. b, representing the broad form common on the California coast, have branched sporophylls, in the form characteristic of *P. coccineum*, not the simpler form of *P. leptophyllum*.

Nitophyllum cryptoneuron (Mont.) De Toni. A small frond, attached to *Polysiphonia*.

* Polysiphonia sp.? A rather coarse form with short segments and four pericentral cells. In habit it somewhat suggests *Streblocladia camptoclada* (Mont.) Falk., but is evidently monopodial. I do not recognize it by the habit, and it adheres so closely to the paper that microscopic examination is difficult.

Pterosiphonia dendroidea (Mont.) Falk. A well developed plant, about 10 cm. high, which is rather large for this species; not in fruit.

Streblocladia spicata M. A. Howe. "Primary branches longer and better developed than in the type." Note by Dr. Howe.

Pleonosporium venustissimum (Mont.) De Toni. With polyspores.

Ceramium rubrum (Huds.) Ag. A small plant, about 3 cm. high, with tetraspores. Cortication uniform, segments short, apices strongly forcipate, but not involute.

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[1] G. B. De Toni, Phyceae Japonicae novae, Mem. Roy. Ist. Venet., Vol. XXV, No. 5, p. 29, 1895.

[2] Id., Sylloge Algarum, Vol. IV, Sect. II, p. 577, 1900.

[3] K. Okamura, Icones of Japanese algae, Vol. III, p. 14, Pl. CIII, figs. 6–7, 1913.

Ceramium clavulatum Ag. A well developed, not much branched form.[1]

The five species starred above are additions to Dr. Howe's list for Peru. I much regret not being able to learn any more about the collector, nor as to whether any other specimens of her collecting are in existence. The character of these specimens is far above the standard of the ordinary "moss collector." There are two species of *Gigartina,* each represented by a single specimen in full cystocarpic fruit; a single specimen of *Gracilaria,* with both cystocarpic and tetrasporic plants; two specimens of the *Plocamium,* one cystocarpic, the other tetrasporic. Very few collectings average as well as does this, for the scientific usefulness of the specimens.

In conclusion, my thanks are due to Prof. Chrysler for the opportunity to re-examine the specimens; to Dr. Howe for his examination of them and his notes; and to all who have helped me in the search for information as to the collector.

North Eastham, Massachusetts.

TWO VARIATIONS OF SILENE ANTIRRHINA.

M. L. Fernald.

Silene antirrhina L., forma **Deaneana,** n. f., internodiis non glutinosis.— Occasional throughout the range of the species. Type: recently cleared land near Winter Pond, Winchester, Massachusetts, June 22, 1913, *Fernald & Long,* no. 9494 (herb. New England Botanical Club).

This form, discussed in some detail by Mr. Walter Deane in Rhodora, xii. 129–131 (1910), is so constant in the colonies where it occurs that it merits some designation; but differing from the typical form of the species only in the absence of the glutinous band found on some of the upper internodes in true *S. antirrhina* and apparently not having a distinct range, the plant is best treated as a form rather than a variety.

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[1] In this connection I would note that an authentic specimen of *Ceramium miniatum* Suhr in my possession shows that the Peruvian plant mentioned by Howe, p. 157, is different; Dr. Howe agrees with me as to this, and expects to take up the matter later.

In the recognized varieties of *S. antirrhina,*— the typical plant, var. *vaccarifolia* Rydberg, var. *depauperata* Rydberg, var. *laevigata* Engelm. & Gray, and var. *divaricata* Robinson, the capsule and close fruiting calyx are ovoid-campanulate in form and the cauline leaves (except in the short-fruited var. *depauperata*) are lanceolate or oblanceolate. In the arid region of New Mexico and Chihuahua, however, the characteristic development of the species is a plant with linear cauline leaves, subcylindric capsules and fruiting calyces, the latter more strongly nerved than in many forms of the species. This plant merits distinction as

S. ANTIRRHINA, var. **confinis**, n. var., foliis crassis, caulinis linearibus; calycibus fructiferis anguste subcylindricis valde costatis, capsulis subcylindricis 6–8 mm. longis 3.5–4 mm. diametro.— NEW MEXICO: Cobre, August, 1851, *Thurber*, no. 1123; White Mts., alt. 7000 ft., August 5, 1897, *Wooton*, no. 286 (transitional). CHIHUAHUA: near St. Diego, alt. 6000 ft., May 15, 1891, *Hartman*, no. 684 (TYPE in Gray Herb.).

GRAY HERBARIUM. fl. white ventrally, pink dorsally.
f. bicolor Farw. Am. Midl. Nat. 11: 55. 1928.
Mich.

MIBORA MINIMA (L.) DESV. AT PLYMOUTH, MASSACHUSETTS.— Among some specimens sent to the Gray Herbarium for determination by Mr. Benj. M. Watson of Plymouth, Massachusetts, were two tufts of a small grass, which Mr. Watson in his letter of April 12th states were growing wild in his nursery and had been in bloom for several weeks. They proved to be *Mibora minima* (L). Desv. a genus and species not previously reported from North America, to the best of my knowledge. It is a native of Europe — Great Britain south to northern Italy and Greece and also of northern Africa. Its generic position in the Manual would be directly after *Alopecurus.*

MIBORA Adans. Fam **2**: 495 (1763).

MIBORA MINIMA (L.) Desv. Obs. Pl. Ang. 45 (1818): Desv. Fl. Anj. 46 (1827). *M. verna* Beauv. Agrost. 30, 148, 167; Atlas 7, t. 8, f. 4 (1812). A small tufted annual 3 to 8 cm. high with short, narrow leaves clustered at the base; the sheaths very thin. Spikelets small, purplish, almost sessile, in a simple, slender spike about 10 to 15 mm. long.— F. TRACY HUBBARD, Cambridge, Massachusetts.

ELYMUS ARENARIUS AND ITS AMERICAN REPRESENTATIVES.

Harold St. John.

Elymus arenarius L. of the sea beaches and sand dunes of the European coasts was known to the early botanists and was treated by Linnaeus in his Species Plantarum.[1] As this species is well marked among its European relatives it has had a simple and uneventful history in botanical literature of the old world. The only question causing any serious difference of opinion is whether *Elymus sabulosus* Bieb. should be treated as a variety of *E. arenarius* or as a distinct species. Differing from the latter by its more vigorous growth, by its larger number of spikelets at a node, by its stiff awl-shaped glabrous glumes, by its lemmas glabrous from the middle to the tip, by its shorter anthers (4.5–5 mm. long), and by its smaller grain (6 mm. long, 1.5 mm. broad), this plant of southern Russia and Siberia with a range scarcely touching that of *E. arenarius*, seems to the writer to be specifically distinct. An earlier name, however, must displace *E. sabulosus* Bieb. Without a known locality, but fourteen years earlier, *Elymus giganteus* Vahl.[2] was described in terms quite applicable to the plant which has so long passed as *E. sabulosus*. In some of the larger herbaria are specimens of a plant grown in cultivation under the name *Elymus mexicanus* Cav.[3] which is indistinguishable from *E. giganteus* Vahl. The great amount of botanical collecting done in Mexico since Cavanilles described his *E. mexicanus* has not established this as one of the native species and its perfect agreement with *E. giganteus* of southern Europe and Asia indicates that Roemer and Schultes[4] were correct in reducing *E. mexicanus* to a synonym of *E. giganteus* Vahl.

In North America the group of coastal species with awnless broad glumes and awnless lemmas, in which *E. arenarius* is included, has had a much more eventful bibliographical history. Kalm detected the

[1] L. Sp. Pl. i. 83 (1753).

[2] Vahl, Sym. Bot. iii. 10 (1794).

[3] Cav. Descr. Pl. 314 (1802).

[4] Roem. & Schult. Syst. Veg. ii. 774 (1817).

presence of "*Elymus arenarius*" on the north shore of the St. Lawrence[1] but the later generation of botanists, Michaux, Bigelow, and Pursh did not know of the presence of the common northern plant in a narrow strip along the coast of the regions about which they wrote.

From specimens found in Kamchatka and the Aleutian Islands *Elymus mollis* Trin.[2] was described, having the culm velvety-pubescent at summit, spikelets about 7-flowered, glumes softly hirsute and 3–5-nerved. *E. arenarius* of Europe has, on the contrary, the culm glabrous or with a mere trace of fine puberulence at the summit; spikelets 2–4-flowered, very stiff and rigid; glumes sparingly hispid or smooth and shining, with a definite midrib and with or without a pair of inconspicuous secondary ribs.

After an interval of nine years Presl proposed the new name *Elymus dives*[3] for a plant found on Nootka Sound, Vancouver Island. His description leaves no doubt but that he was dealing with the plant having culms velvety-pubescent at summit, the glumes many-nerved and softly hirsute, which Trinius had already named *E. mollis.*

In the same year, 1830, this plant, when found on the eastern coast of North America in Labrador, was published by Meyer as var. *villosus* of *E. arenarius.*[4] He gives with this new name a few comments upon the appearance of the new variety which differs from the European *E. arenarius* by having villous longer spikelets. This hint as to the characters and the identity with *E. mollis* of all recent collections from Labrador referred to *E. arenarius*, var. *villosus* convinces the writer that *E. arenarius* L., var. *villosus* E. Mey. and *E. mollis* Trin. are one and the same.

From another eastern station, Isle-Verte, Temiscouata Co., Quebec, a species of the same affinity, *E. ampliculmis* Provancher[5] was given a full and definite description. The points, "Chaume pubescent au sommet 5–8 flores" show clearly enough that this plant belongs with *E. arenarius*, var. *villosus.* In fact, *E. mollis* is cited as a synonym under the new species *E. ampliculmis,* but the principle of priority does not allow such a change as this to be followed.

For many years this group of American plants called *Elymus mollis* was thought to be sufficiently understood, but in 1898, *E. capitatus*

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[1] Kalm, Reise nach nordlichen Amerika iii. 515 (1764).

[2] Trinius in Spreng. Neue Entdeck. ii. 72 (1821).

[3] Presl, Rel. Haenk. i. 265 (1830).

[4] E. Meyer, Pl. Labrador. 20 (1830).

[5] Provancher, Fl. Canad. ii. 706 (1862).

Scribner[1] from Homer, Alaska, was set off, differing in having short thick spikes, 3–4 cm. in diameter, and longer floral parts. On dissecting, it can be seen that the grain is longer and lanceolate in outline, instead of oblong as are the shorter grains of *E. mollis* and *E. arenarius.* Dissection of the grain of *E. capitatus* shows within, instead of hard compact stored food material, a mass of spongy white tissue only partially filling the space. Specimens such as Piper's no. 4664 from Kenai, Alaska, Aug. 18–20, 1904, bearing from one rootstock two flowering culms, one of which is undeniably *E. mollis* Trin., and the other as surely *E. capitatus* Scribn., indicate clearly enough that *E. capitatus* Scribn. is a pathological state of *E. mollis* Trin. In a later article[2] published with Merrill, Scribner himself included *E. capitatus* under *E. mollis* Trin.

From northwestern North America *E. villosissimus* Scribner[3] of this same group was described, but this plant is so very like *E. arenarius,* var. *villosus* that it is not easy to discuss its differences. Scribner and Merrill[4] in their "Grasses of Alaska" fail to add any new characters, although they maintain *E. villosissimus* as a species. Their key difference is

Spike less than 8 cm. in length........................*E. villosissimus.*
Spike exceeding 10 cm. in length..............................*E. mollis.*

In the description following, which is a condensed form of the original one, *E. villosissimus* is allowed to have spikes from 5 to 8 cm. in length. According to this arrangement what is to be done with plants which have spikes less than 5 cm. in length, or more than 8 and less than 10 cm. in length? Such plants are no less common than those which fall between the artificial limits set to define *E. villosissimus.* The plant called *E. mollis* has been found in the far north with spikes as short as 4 cm. and near its southern limit with spikes as long as 35 cm. Any large collection will show from intermediate regions a complete series of specimens with no appreciable break in the length of spikes. From this it is plain to the author that *E. villosissimus* Scribn. must be treated as a synonym of *E. arenarius,* var. *villosus.*

The older herbarium-sheets of *E. arenarius,* var. *villosus* show an interesting tide of opinion, almost all giving evidence of numerous alterations of the name by different workers from *E. mollis* to *E. arenarius* and back again. An examination of the various North American Floras discloses a similar vacillating policy in the treatment of *E. arenarius* and *E. mollis.* Many contain such comments as "Cette Espèce est très voisine de l'Espèce Arenarius d'Europe" (Provancher), or "Near E. arenarius" (Gray), or "the confusion that seems to exist between this species and E. mollis" (Macoun).

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[1] Scribner, Bull. U. S. Div. Agrost. xi. 55, pl. xiv (1898).
[2] Scribner & Merrill, Contrib. U. S. Nat. Herb. xiii. Pt. 3, 90 (1910).
[3] Scribner, Bull. U. S. Div. Agrost. xvii. 326, fig. 622 (1899).
[4] Scribner & Merrill, l. c., 89 (1910).

Specimens of *E. arenarius*, var. *villosus* from the southern part of the range, the coast of New England or California, are superficially enough like *E. arenarius* of Europe to be confusing. They have the glumes sometimes nearly glabrous and scarcely soft in texture. On the other hand, specimens from the far north are strikingly different from *E. arenarius* because of the extremely soft texture of the glumes and their heavy coat of long villous pubescence, but because of the perfect series of transitions these two tendencies seem to be due to climatic factors and to be negligible from the point of view of classification. This whole series of plants representing *E. arenarius*, var. *villosus* has, however, the positive distinguishing characters of culm velvety-pubescent at summit, and glumes pliant, pubescent, and prominently 3–5-nerved. The great mass of material of the European *E. arenarius* has the glumes stiff, hard, with a prominent mid-nerve, with or without less developed lateral nerves, and with the summit of the culm glabrous. If this were an absolute rule the American plant called var. *villosus* by Meyer would seem to be a distinct species, but occasional specimens of *E. arenarius* from Europe show a trace of puberulence at the summit of the culm. On the other hand, occasional specimens of the plant from the northern American or Asiatic coasts, although conspicuously pubescent at the summit of the culm, have the lateral nerves of the glumes less developed than in more typical specimens. Because of these transitions and the identity of the anthers and grains it seems best to treat the American and Asiatic plant, with the culm velvety pubescent at summit and the glumes 3–5-nerved, as *Elymus arenarius* L., var. *villosus* E. Meyer.

The geographic distribution of *E. arenarius*, var. *villosus* is very extensive as it grows on the beaches and brackish shores from Alaska south along the coast to Santa Cruz, California, on the Arctic Archipelago, the shores of Hudson Bay, and of Lake Superior, and from Labrador south along the coast to Cape Cod, Massachusetts, on Greenland, and from Bering Straits south to Japan. This statement of range is made up from actual specimens observed. The inclusion of localities based on published records, which in many cases give either no description at all or one so scanty that it is impossible to tell whether the var. *villosus* or *E. arenarius* is the subject, would merely continue the confusion which has so long existed between these two plants.

From three localities on Puget Sound are collections of a plant which is allied to *E. arenarius*, var. *villosus* because of the pubescent summit of the culm and the nerves of the glumes, but the spikelets are longer, stiffer, often 5–8-flowered, and borne on definite pedicels which are often prolonged and branched, bearing several spikelets. *Elymus arenarius*, f. *compositus* Abromeit, although I have seen no specimens, seems to be a perfect match for this well marked plant from the State of Washington, because of the points clearly mentioned in the original description. "Die Ähren entwickeln im unteren und mittleren Teile statt der 3–4 blütigen Ährchen gegen 4 cm. lange und etwa 8 blütige Seitenäste. Beobachtet: Bei Kome [Greenland] unter normalen Exemplaren der Form *β villosus*." This unusual plant may be known as

ELYMUS ARENARIUS L., var. **compositus** (Abromeit), n. comb. *E. arenarius* L., f. *compositus* Abromeit, Bibliot. Bot. viii. heft 42, 96 (1899). The following North American stations are known: WASHINGTON: on sandy ground, shore of Bellingham Bay, July 17, 1890, *W. N. Suksdorf*, no. 1028; on high sea beaches, Fairhaven, July 2, 1897, *C. V. Piper*, no. 2606; Everett, July 7, 1904, *C. V. Piper*, no. 4909.

A noteworthy plant of this group of awnless, broad-glumed, maritime species has been collected along the sea coast at Westport, California. Like *E. arenarius* of Europe it has the summit of the culm perfectly glabrous; and like the var. *villosus* of the American continent it has the glumes prominently ribbed, but it differs from both in having the lemmas glabrous at base, pulverulent above, in having a smaller grain (5 mm. long), and a smaller anther (1.5 mm. long). Because of its marked differences from these near relatives it is proposed as

ELYMUS **strigatus**, n. sp., caespitosus perennis 2.5–4 dm. altus, culmo paullum striato glabro, vaginis laxis profunde striatis, strigis cellulari-reticulatis, ligulis brevissimis (1 mm. longis), laminis linearibus (4–14 cm. longis, 2–6 mm. latis) gabris profunde striatis, spica 6–11 cm. longa, 6–10 mm. lata, spiculis appressis vel geminis vel solitariis ad basim spicae 1–3-floris, flosculo supremo sterili, glumis lanceolatis (10–15 mm. longis, 1.5–4 mm. latis) cum nervis 4–7 prominentibus, lemmis ad basim glabris supra pulverulentis, exteriori 9 mm. longo acuto, interiori 8 mm. longo obtuso, antheris 1.5 mm. longis, palea semen oblongum (5 mm. longum, 1 mm. latum) arcte amplectenti.

Tufted perennial, 2.5–4 dm. high: the culm slightly striate and quite smooth: leaf-sheaths loose, deeply striate, cellular-reticulate in the channels; ligule scarious and very short (1 mm. long); leaf-blades linear (4–14 cm. long, 2–6 mm. broad) smooth, deeply striate: spike 6–11 cm. long, 6–10 mm. thick: spikelets appressed, paired, or often single at the base of the spike, 1–3-flowered; the upper flower sterile: glumes lanceolate, 10–15 mm. long, 1.5–4 mm. broad, with 4–7 prominent raised strigose nerves: lemmas glabrous at base, pulverulent above; the outer 9 mm. long, pointed; the inner 8 mm. long, blunt: anthers 1.5 mm. long: palea closely investing the grain: grain oblong, 5 mm. long, 1 mm. broad. CALIFORNIA: sea cliffs, Champion gulch, below Westport, Mendocino Co., August 1, 1902, *J. W. Congdon* (TYPE in U. S. Nat. Herb.); sea cliffs below Westport, August 1, 1902, *J. W. Congdon.*

Key to the Species and Varieties Discussed.

A. Grain 6–10 mm. long: anther 4.5–6.5 mm. long: leaf blades scabrous above,
  B. Spikelets normally more than two at a node: glumes awl-shaped: lemmas pubescent up to the middle............... *E. giganteus* Vahl.
  B. Spikelets normally paired: glumes lanceolate or linear-lanceolate: lemmas pubescent to the tip,
    C. Summit of culm glabrous: glumes stiff and hard, 1- rarely 3-nerved, often glabrous and shining.................. *E. arenarius* L.
    C. Summit of culm velvety-pubescent: glumes 3–5-nerved,
      Spikelets sessile: glumes pliant, softly villous, or rarely glabrate *E. arenarius* L., var. *villosus* E. Mey.
      Spikelets pedicelled: glumes stiff, hispid or glabrate *E. arenarius* L., var. *compositus* (Abro.) St. John.
A. Grain 5 mm. long: anther 1.5 mm. long: leaf blades smooth: summit of culm glabrous: glumes scabrous, prominently 4–7-ridged: lemmas glabrous at base, pulverulent above............. *E strigatus* St. John.

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[1] FIELD BOOK OF AMERICAN TREES AND SHRUBS. By F. Schuyler Mathews. pp. 465 + xvi, freely illustrated. Cloth $2.00; full leather, $2.50; postage 15 cents. G. P. Putnam's Sons, New York.

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